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Hall F, West Concourse
Electrocardiography and Ambulatory Monitoring—Myocardial Ischemia/Infarction

POSTERIOR LEADS DETECT MYOCARDIAL INJURY DURING CIRCUMFLEX CORONARY ARTERY OCCLUSION

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Although patients with true posterior infarction due to circumflex coronary artery occlusion may have ST segment depression in anterior ECG leads, they often have no ST segment elevation indicative of myocardial injury. Consequently many of these patients do not receive thrombolytic therapy. We hypothesized that posterior ECG leads would demonstrate ST elevation in a significant percentage of patients with circumflex occlusion in whom traditional ECG leads show no elevation. Accordingly, we placed 5 unipolar surface ECG leads over the posterior torso and compared ST segment changes in these leads with ST changes in the 12 standard ECG leads in 39 patients undergoing circumflex or obtuse marginal coronary artery balloon angioplasty. A 12-lead ECG, posterior leads and an intracoronary ECG were obtained before and after 120 sec of balloon inflation. A change of $\geq$ 0.05 mV from baseline in $\geq$ two leads at 120 sec of occlusion was considered a significant ST segment shift. Balloon inflation caused intracoronary ST segment elevation in 35 of 39 patients and a downward ST segment shift (i.e., depression from baseline) in standard leads V1-V4 in 35 of 39 patients. Balloon inflation caused an upward ST segment shift (i.e., elevation from baseline) in both standard and posterior leads in 15 patients, and no upward shift in either lead system in 15 patients. An upward ST segment shift occurred in posterior leads alone in 8 patients and standard leads alone in 1 patient ($p < 0.05$). We conclude that posterior leads register an upward ST segment shift in a significant number of patients with circumflex coronary artery occlusion who have no upward shift in standard ECG leads. Thus, recording of posterior leads may identify additional patients with circumflex occlusion who would benefit from thrombolytic therapy.

IMPROVEMENT IN AUTONOMIC ACTIVITY AFTER PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY: ASSESSMENT BY HEART RATE VARIABILITY.

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Autonomic activity may be adversely affected by a significant reduction in regional myocardial blood flow. To test this hypothesis, we evaluated nine patients with angina pectoris before and after percutaneous transluminal coronary angioplasty (PTCA), using heart rate variability (HRV) as the index of autonomic (parasympathetic) activity. Twenty-four hour ambulatory ECGs and HRV analyses were obtained before and two weeks following PTCA. The time domain measure of HRV used was the standard deviation of mean R-R intervals in five minute segments over 24 hours (SDANN). The normal SDANN is $\geq$ 50 msec. In addition, the power spectrum of sinus R-R intervals was examined for changes in those frequency bands associated with parasympathetic and sympathetic activity. All nine patients had successful PTCA. At two week follow up, medications were unchanged and no patient had recurrent angina. The mean SDANN prior to PTCA was 92 ± 26 msec and after PTCA was 104 ± 22 msec. The mean difference of 12 ± 14 msec was significant ($p < 0.04$) by two-tailed paired T-test. Power spectral analysis showed that after PTCA six of nine patients had increased parasympathetic and/or decreased sympathetic activity. Of these, five had increased HRV.

These data demonstrate that HRV significantly increases following successful PTCA. Thus, increasing regional myocardial blood flow improves autonomic activity in patients with compromised coronary circulation.

VALUE OF INTRACORONARY VENOUS ELECTROCARDIOGRAM TO DETECT REGIONAL MYOCARDIAL ISCHEMIA DURING ATRIAL PACING STRESS TEST: COMPARISON WITH LACTATE METABOLISM

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Intracoronary ECG is proved to be more sensitive than standard ECG(12-ECG) in detecting myocardial ischemia during PTCA. It is hazardous, however, to insert the guidewire into the coronary artery other than during PTCA. Therefore, we developed the method of intracoronary venous ECG(icv-ECG). Studied were 38 patients with effort angina. Unipolar iv-ECG was recorded from a guidewire in the anterior interventricular vein running parallel with LAD. ST shift in iv-ECG and 12-ECG during atrial pacing stress test(APST) were measured. Aorto-coronary sinus differences of lactate extraction ratio(LER) as an index of myocardial ischemia were calculated.

Results: Iv-ECG could be safely recorded. ST shift in iv-ECG correlated well with LER. When considered LER<0% as a gold standard of ischemia, and the criteria of ST elevation or depression>0.1mV for 12-ECG and that of ST elevation>0.1mV or ST depression>0.15mV for iv-ECG were used, the sensitivity and the specificity were as follows:

	12-ECG	icv-ECG
sensitivity	68%(19/28)	100%(28/28)
specificity	90%(9/10)	80%(8/10)

Conclusion: These data indicate that iv-ECG was safe and superior to 12-ECG in detecting regional myocardial ischemia during APST.

IMPORTANCE OF Q WAVES ON THE INITIAL ECG IN PATIENTS CONSIDERED FOR THROMBOLYTIC THERAPY.

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The effect of Q waves on the initial ECGs of patients with possible acute myocardial infarction (AMI) was determined to assess their importance in correctly predicting AMI and secondary complications. During a trial of pre-hospital thrombolytic therapy, 1462 patients with possible AMI had 12-lead ECGs recorded 72 ± 56 minutes after chest pain onset. The initial ECG findings were categorized by the presence, absence and location of Q waves and ST segment changes.

ST segment elevation with or without Q waves in the same lead groups showed a positive predictive value of 66% for AMI. When Q waves were present in different leads from ST elevation, predictive value was significantly higher (81%; $p=0.03$). The incidence of AMI in patients with initial ST depression was less and not influenced by Q waves: isolated ST depression (30%), ST depression and Q waves in same leads (20%), and ST depression and Q waves in different lead groups (33%). The relationship of Q waves to prior MI was also assessed. In the setting of ST elevation, Q waves were inversely correlated with prior MI; history present in 36% of those with and 42% of those without Q waves ($p<0.01$). In patients with ST depression, however, Q waves were predictive of prior MI, history present in 58% of those with and 29% of those without Q waves ($p < 0.01$).

The presence of Q waves on the initial ECG was associated with higher mortality (11.8%) compared with patients without Q waves (6.1%; $p=0.06$), independent of the effect of prior MI or congestive heart failure. This study shows that Q waves add predictive value to ST elevation but not to ST depression in the diagnosis of AMI. Initial Q waves are also a marker of higher subsequent mortality, independent of prior history.